EVALUATION OF *Afzelia africana* SEEDS AS PROTEIN FEEDSTUFF IN FISH DIETS

[1]V.N. Nwachukwu & [2]S.U. Ndubuisi
[1]Department of Fisheries Technology, Federal Polytechnic Nekede Owerri
[2]Department of Biology/Microbiology, Federal Polytechnic Nekede Owerri

ABSTRACT
Seeds of the legume *Afzelia africana* were analyzed and evaluated for use as protein feedstuff in fish diets. The seeds were heated to inactivate the antinutritional factors. Two iso-nitrogenous diets (26%) were produced using *A. africana* or Bonga-fishmeal as protein sources and labeled F1 and F2, respectively. The resulting pellets were sinking pellets and were well accepted by tilapia based on the reaction time to feed presence and proportion of pellets eaten within one hour. F1 pellets were more stable in water than F2 pellets with mean dissolution times of 190 mins and 135 mins, respectively.

INTRODUCTION
In a recession economy such as we are in, sustainable fish production that is affordable is a key factor in national food security. The use of expensive fish meals in fish diets makes fish farming unprofitable for most farmers and unsustainable (New 2001). Protein from plant- derived materials like legume seeds, leaf meals etc have been canvassed as fishmeal alternatives (Kissil et al.,1997; and Francis et al., 2001). *A. africana* is a novel legume that is locally available, cheap and has the potentials to substitute fishmeal wholly or partially in practical fish diets.

MATERIALS AND METHODS
Proximate analysis on *A. africana* was carried out to determine the chemical composition using standard methods. Two pelleted isonitrogenous diets (CP=26%) were produced from *A. afzelia* seeds and fishmeal and labelled F1 and F2, respectively (table 1)

Table 1. Gross composition of experimental diets

Feed ingredients	F1	F2
Maize flour	5.9	151.9
Rice bran	5.9	151.9
A. Africana	228.2	-
Fishmeal	-	176.2
Vitamin (premix)	3.75	7.5
Palm oil	1.25	2.5
Salt (Nacl)	1.25	2.5
Bone meal	3.75	-

Tilapia species was the test fish and acceptability was determined by introducing 20 pellets of F1 and F2 (mean wt., 2g) into the experimental tanks. The react time of the fishes to the presence of food and the proportion of the pellets eaten formed the basis of determining acceptability. The dissolution time (DT) for 100% of the F1 and F2 pellets to completely dissolve in water were used to determine water stability of the pellets (Nwachukwu and Osuigwe 1997). The floatation/ sinking properties of diets were determined thus: Dry F1 and F2 dietss were introduced into separate 1 litre capacity beakers filled with water. The pellets were timed to determine how long the pellets will float before sinking.

RESULTS AND DISCUSSION
The results of all analysis on seeds of *A. africana* are shown in tables 2-5; while experimental results are presented in tables 6 and 7. The fishes responded better to F2 diet than F1 diet (table 6). However, the response to the F1 diets was high also and being cost-effective is recommended for use in fish diets. Table 7 shows that F1 diet was more water-stable (DT = 190mins) than F2 diet (DT=135mins). and may be due to the carbohydrate in *A. africana* having a high gelatinizing ability. Both pellets can be classified as sinking pellets since most of them did not float long in water

RESULTS

The nutrient and antinutrient composition on *A. africana* are shown in tables 2, 3, 4 and 5

Table 2. Proximate composition of *Afzelia africana (%)*

Crude protein	Ash	Crude fibre	Crude fat	Carbohydrate	Moisture
26.86	2.71	4.76	29.6	31.37	4.70

Table 3. Antinutrient contents of *Afzelia africana* (%)

Alkaloid	Phenol	Trypsin inhibitor	Tannin	Hydrogen cyanide (mg/kg)	Phytate
0.42	2.5	0.37	0.083	9.06	0.277

Table 4. Vitamin content of *Afzelia africana*

Vitamin A (iu/100)	Vitamin D (mg/100g)	Vitamin E (iu/100)	Thiamine B1	Riboflavin
52.12	28.33	3.46	2.50	2.5

Table 5. Mineral composition of *Afzelia africana* (mg/100g)

Phosphorus	Sodium	Potassium	Calcium	Magnesium
281.63	11.61	361.50	86.17	78.40

Tables 6. Response time of fish to feed presence in water and proportion of pellets consumed.

(a)Type of feed	Time in seconds			Total time	Mean($\bar{x}$) time
	R1	R2	R3		
F1(legume)	180	184	176	540	180 (-3mins)
F2(Fishmeal)	60	60	60	180	60 (1min)
(b) Type of feed	Proportion Of Pellets			Total	Mean ($\bar{X}$) time
F1 (legume)	15	11	13	39	13(pellets)
F2 (Fishmeal)	18	17	19	54	18 (pellets)

Table 7. Stability properties (Dissolution time) of the two feeds in water

Feed Type	Dissolution time (mins)			Total time	Dissolution time (mins)
F1 (legume)	179	193	197	569	190
F2 (fishmeal)	129	141	136	406	135

The imperatives for sustainable fish production and food security in a recession economy are to develop cheaper alternatives to the expensive fishmeal component of fish feeds. *A. africana* seeds have positive characteristics that situate it as a fishmeal replacer in fish diets.

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